[0044] In antenna **40** of FIG. **7**, antenna **40** of FIG. **8**, and other dual-port patch antennas, the first feed (i.e., the feed associated with first port P1) may be located along a central long axis of patch element **110** (see, e.g., major axis **122** of patch **110** of FIG. **8**) and the second feed (i.e., the feed associated with second port P2) may be located along a perpendicular central short axis of patch element **110** (see, e.g., minor axis **124** of FIG. **8**). An optional shorting pin may be connected between ground **112** and patch **110** at central point **120** where the longer and shorter central axes of patch **110** intersect to help ensure that antenna impedance is minimized (i.e., near to zero) in the middle of antenna **40**.

[0045] FIG. **9** is a graph in which antenna efficiency has been plotted as a function of operating frequency for an illustrative dual-polarization dual-frequency patch antenna. Efficiency curve **130** may be characterized by first peak **132**, which is associated with operations using port P1, and second peak **134**, which is associated with operations using port P2. Peaks **132** and **134** may be aligned with desired frequencies of operation for devices **10**A and **10**B. For example, when supporting millimeter wave communications at 60 GHz, peaks **132** and **134** may be used to cover the four channels associated with IEEE 802.11 ad communications (i.e., IEEE 802.11 ad channel 1 at a frequency f1 of 58.32 GHz, channel 2 at a frequency f2 of 60.48 GHz, channel 3 at a frequency f3 of 62.64 GHz, and channel 4 at a frequency f4 of 64.80 GHz). Advantages of using two closely spaced diversely polarized peaks such as peaks **132** and **134** of curve **130** of FIG. **9** rather than a single wide peak include enhanced efficiency and system bandwidth. Dual-polarization dual-frequency patch antenna **40** may also exhibit enhanced directionality, which helps ensure that beam steering operations will be successful when using an array of antennas **40**.

[0046] The foregoing is merely illustrative and various modifications can be made by those skilled in the art without departing from the scope and spirit of the described embodiments. The foregoing embodiments may be implemented individually or in any combination.

What is claimed is:

1. An electronic device that wirelessly transfers power to an external device, comprising:

wireless power transfer circuitry; and

a dual-polarization dual-frequency patch antenna that is coupled to the wireless power transfer circuitry and that is configured to wirelessly transfer power from the wireless power transfer circuitry to the external device.

2. The electronic device defined in claim **1**, wherein the dual-polarization dual-frequency patch antenna has a patch antenna resonating element and a ground, wherein the patch antenna resonating element and the ground lie in separate parallel planes, wherein the patch antenna resonating element has first and second perpendicular central axes, wherein dual-polarization dual-frequency patch antenna has a first feed that lies along the first central axis, and wherein the dual-polarization dual-frequency patch antenna has a second feed that lies along the second central axis.

3. The electronic device defined in claim **2** wherein the first and second central axes intersect at an intersection point, wherein the first feed lies along the first central axis at a location other than an intersection point, and wherein the second feed lies along the second central axis at a location other than the intersection point.

4. The electronic device defined in claim **3** wherein the dual-polarization dual-frequency patch antenna comprises a shorting pin that shorts the patch antenna resonating element to the ground at the intersection point.

5. The electronic device defined in claim **1** further comprising an array of antennas that includes the dual-frequency dual-polarization patch antenna.

6. The electronic device defined in claim **5** wherein the wireless power transfer circuitry comprises adjustable circuitry that performs beam steering with the array of antennas during wireless power transfer operations between the wireless power transfer circuitry and the external device.

7. The electronic device defined in claim **6** further comprising a display, wherein the wireless power transfer circuitry is configured to transfer power wirelessly at microwave frequencies using the array of antennas.

8. An electronic device that communicates wirelessly with an external device, comprising:

millimeter wave wireless communications circuitry; and

a dual-polarization dual-frequency patch antenna that is coupled to the millimeter wave wireless communications circuitry and that is configured to communicate wirelessly with the external device.

9. The electronic device defined in claim **8**, wherein the dual-polarization dual-frequency patch antenna has a patch antenna resonating element and a ground, wherein the patch antenna resonating element and the ground lie in separate parallel planes, wherein the patch antenna resonating element has first and second perpendicular central axes, wherein dual-polarization dual-frequency patch antenna has a first feed that lies along the first central axis, and wherein the dual-polarization dual-frequency patch antenna has a second feed that lies along the second central axis.

10. The electronic device defined in claim **9** wherein the millimeter wave wireless communications circuitry communicates in channels at first, second, third, and fourth frequencies, wherein the dual-polarization dual-frequency patch antenna has a first resonance peak that covers the first and second frequencies and a second resonance peak that covers the third and fourth frequencies.

11. The electronic device defined in claim **10** wherein the first, second, third, and fourth frequencies are associated respectively with first, second, third, and fourth frequencies 60 GHz communications channels.

12. The electronic device defined in claim **11** wherein the first, second, third, and fourth frequencies are associated respectively with first, second, third, and fourth IEEE 802.11 ad channels.

13. The electronic device defined in claim **11** wherein the first and second central axes intersect at an intersection point and wherein the dual-polarization dual-frequency patch antenna comprises a shorting pin that shorts the patch antenna resonating element to the ground at the intersection point.

14. The electronic device defined in claim **8** wherein the dual-polarization dual-frequency patch antenna comprises one of an array of dual-polarization dual-frequency patch antennas.

15. The electronic device defined in claim **14** wherein the millimeter wave wireless communications circuitry comprises adjustable circuitry that performs beam steering with the array of dual-polarization dual-frequency patch antennas